

FORM PTO-1390		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371	ATTORNEY'S DOCKET NUMBER: BO 42118 JGD U.S. APPL. NO. <small>if known, see 37 CFR 1.51</small> 09/857786
INTERNATIONAL APPLICATION NO.: PCT/NL99/00757	INTERNATIONAL FILING DATE: 10 December 1999	PRIORITY DATE CLAIMED: December 11, 1998	
TITLE OF INVENTION: COLLISION-RESISTANT DOUBLE-SKIN STRUCTURE, SUCH AS A DOUBLE-SKINNED SHIP'S SIDE			
APPLICANT(S) FOR DO/EO/US: Johannes Wilhelmus Lubertus LUDOLPHIJ			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
1.	<input checked="" type="checkbox"/>	This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.	
2.	<input type="checkbox"/>	This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.	
3.	<input checked="" type="checkbox"/>	This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).	
4.	<input checked="" type="checkbox"/>	A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.	
5.	<input checked="" type="checkbox"/>	A copy of the International Application as filed (35 U.S.C. 371(c)(2))	
	<input checked="" type="checkbox"/>	a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).	
	<input type="checkbox"/>	b. <input type="checkbox"/> has been transmitted by the International Bureau. (see attached copy of PCT/IB/308)	
	<input type="checkbox"/>	c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).	
6.	<input type="checkbox"/>	A translation of the International Application into English (35 U.S.C. 371(c)(2)).	
7.	<input type="checkbox"/>	Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).	
	<input type="checkbox"/>	a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).	
	<input type="checkbox"/>	b. <input type="checkbox"/> have been transmitted by the International Bureau.	
	<input type="checkbox"/>	c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.	
	<input type="checkbox"/>	d. <input type="checkbox"/> have not been made and will not be made.	
8.	<input type="checkbox"/>	A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).	
9.	<input type="checkbox"/>	An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).	
10.	<input type="checkbox"/>	A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).	
Item 11. to 16. below concern document(s) or information included:			
11.	<input type="checkbox"/>	An Information Disclosure Statement under 37 CFR 1.97 and 1.98.	
12.	<input type="checkbox"/>	An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.	
13.	<input checked="" type="checkbox"/>	A FIRST preliminary amendment.	
	<input type="checkbox"/>	A SECOND or SUBSEQUENT preliminary amendment.	
14.	<input type="checkbox"/>	A substitute specification.	
15.	<input type="checkbox"/>	A change of power of attorney and/or address letter.	
16.	<input checked="" type="checkbox"/>	Other items or information: International Preliminary Examination Report (PCT/IPEA/409) International Search Report (PCT/ISA/210) Abstract on a Separate Sheet Application Data Sheet	

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/857786	INTERNATIONAL APPLICATION NO. No. PCT/NL99/00757	ATTORNEY'S DOCKET NO. BO 42118 JGD
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17. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$ 1,000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$ 860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$ 710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$ 690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$ 100.00 <div style="text-align: right; margin-top: 10px;"> ENTER APPROPRIATE BASIC FEE AMOUNT = </div>				<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	
Surcharge of \$130.00 for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	6 - 20 =	0	X \$18.00	\$ 0	
Independent claims	1 - 3 =	0	X \$80.00	\$ 0	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ \$270.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$ 990.00	
Reduction of 1/2 for filing by small entity, if applicable. Applicant claims Small Entity Status under 37 CFR 1.27.				\$	
SUBTOTAL =				\$ 990.00	
Processing fee of \$130 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.49(f)).				\$ 0	
TOTAL NATIONAL FEE =				\$ 990.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$ 0	
TOTAL FEES ENCLOSED =				\$ 990.00	
				Amount to be refunded:	
				charged:	

- | | | |
|----|-------------------------------------|--|
| a. | <input checked="" type="checkbox"/> | A check in the amount of \$ 990.00 to cover the above fees is enclosed. |
| b. | <input type="checkbox"/> | Please charge my Deposit Account No. 25-0120 in the amount of \$ to cover the above fees. A duplicate copy of this sheet is enclosed. |
| c. | <input checked="" type="checkbox"/> | The Commissioner is hereby authorized to charge any additional fees which may be required by 37 CFR 1.16 and 1.17, or credit any overpayment to Deposit Account No. 25-0120 . A duplicate copy of this sheet is enclosed. |

SEND ALL CORRESPONDENCE TO:

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 745 South 23rd Street
 2nd Floor
 Arlington, VA 22202
 (703) 521-2297 facsimile (703) 685-0573

By *Benoit Castel*
 Benoît Castel
 Attorney for Applicant
 Registration No. 35,041

June 11, 2001

09/857786
531 Rec'd PCT 11 JUN 2001
PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Johannes Wilhelmus Lubertus LUDOLPHIJ

Serial No. (unknown)

Filed herewith

COLLISION-RESISTANT
DOUBLE-SKIN STRUCTURE,
SUCH AS A DOUBLE-SKINNED
SHIP'S SIDE

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents

Washington, D.C. 20231

Sir:

Prior to calculation of the filing fee, please amend
the above-identified application as follows:

IN THE CLAIMS:

Please amend claim 3 as follows:

3. (Amended) Structure according to Claim 1,
characterised in that those channel parts (4, 5) directed
towards the inner surface of the outer skin of the ship's side
make an angle α of less than 90° with said outer skin.

Please amend claim 4 as follows:

4. (Amended) Structure according to Claim 1,
characterised in that channels (3) are also arranged on the
inner surface of the inner skin (2), which channels (3) are
attached by the tips of the side walls to said inner surface,

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and in that the said stringers (7) extend between the channels (3) arranged on the outer skin (1) and the channels (3) arranged on the inner skin (2).

Please amend claim 5 as follows:

5. (Amended) Structure according to Claim 1, characterised in that the channels (3) of each series are joined to one another to form a corrugated plate.

Please amend claim 6 as follows:

6. (Amended) Structure according to Claim 1, characterised in that the structure is made of steel 37.

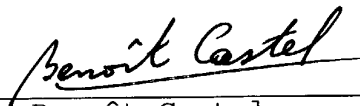
R E M A R K S

Attached herewith is a marked-up version of the changes made in the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,

YOUNG & THOMPSON

By


Benoît Castel
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745 South 23rd Street
Arlington, VA 22202
Telephone: 703/521-2297

June 11, 2001

Johannes Wilhelmus Lubertus LUDOLPHIJ

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 3 has been amended as follows:

3. (Amended) Structure according to Claim 1 ~~or 2~~, characterised in that those channel parts (4, 5) directed towards the inner surface of the outer skin of the ship's side make an angle α of less than 90° with said outer skin.

Claim 4 has been amended as follows:

4. (Amended) Structure according to ~~one of the preceding claims~~, Claim 1, characterised in that channels (3) are also arranged on the inner surface of the inner skin (2), which channels (3) are attached by the tips of the side walls to said inner surface, and in that the said stringers (7) extend between the channels (3) arranged on the outer skin (1) and the channels (3) arranged on the inner skin (2).

Claim 5 has been amended as follows:

5. (Amended) Structure according to ~~one of the preceding claims~~, Claim 1, characterised in that the channels (3) of each series are joined to one another to form a corrugated plate.

Claim 6 has been amended as follows:

6. (Amended) Structure according to ~~one of the preceding claims~~, Claim 1, characterised in that the structure

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is made of steel 37.

1/PRTS

09/857788-1401
531 Rec'd PCT. 11 JUN 2001
PCT/NL99/00757

WO 00/35746

Title: Collision-resistant double-skin structure

The invention relates to a collision-resistant double-skin structure, such as a double-skinned ship's side.

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If oil tankers are involved in collisions or run aground this can result in severe pollution of the environment if the hull is holed. The same applies in respect of chemical tankers on inland waterways. Existing ferries run the risk of being holed in the side in the event of a collision, which under certain circumstances gives rise to an appreciable safety risk for the passengers. It is thus apparent that improvement in the impact and explosion resistance of double-skinned structures of ships, offshore installations and facilities for the processing industry is extremely important.

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The aim of the invention is to provide a substantially improved collision- and explosion-resistant double-skinned structure. According to the invention, to this end the structure comprises:

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a series of channels made of a ductile material and positioned alongside or above one another, which channels are attached by the tips of their side walls to the inner surface of the outer skin of the structure, the base of each channel being connected at least by a stringer, essentially perpendicular to said base, to the inner skin of the structure or to a construction attached thereto.

20

The substantially improved resistance to holing is achieved in that in the event of a collision the dent manifests itself over a substantial width, the ideal membrane stress being achieved and the resistance to holing being maximum.

25

An even better result is achieved if the bases of successive channels are joined to one another by means of strips or a stringer. The strips or the stringer provide for symmetrical deformation of both side walls of the channels at the start of the collision. The strips or the stringer then break off. Should the strips or the stringer not be present there is a risk in a collision of one of the side walls of the channels being deflected substantially to one side and the other side wall following the first side wall. This non-symmetrical displacement of the side walls of the channels leads to a reduction in the resistance to holing.

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The intention is that those channel parts or side walls directed towards the inner surface of the outer skin of the ship's side make an angle α of less than 90° with said outer skin.

- 5 Individual channels can be used. Instead of this the channels can also be joined to one another to form a single corrugated plate.

In the case of a particular structure, channels are also arranged on the inner surface of the inner skin, which channels are attached by the tips of the side walls to said inner surface, and
10 the said stringers extend between the channels arranged on the outer skin and the channels arranged on the inner skin.

The material of the structure must be ductile. Steel 37 proves to be an excellent material, but some plastics and materials which have a so-called collapse path, such as certain composites
15 and sandwich materials, can also be processed.

The invention will now be explained on the basis of the description of the figures.

Figure 1 shows a perspective view of part of a double-skinned ship's side according to a first
20 embodiment of the invention.

Figure 2 shows a vertical section of the ship's side according to Figure 1.

Figure 3 shows a vertical section of the ship's side according to Figure 1 after a severe
25 collision.

Figure 4 shows a vertical section of a second embodiment of a ship's side.

Figure 5 shows a vertical section of a third embodiment of a ship's side.
30

The double-skinned structure shown in Figures 1 and 2 comprises an outer skin 1 and an inner skin 2. Channels 3 are attached to the inner surface of the outer skin 1. The channels have two side walls 4, 5, which make an angle of 45° with the outer skin 1, and a base 6,

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3

which joins the two side walls 4 and 5 to one another. A stringer 7 extends from the base 6 of the channels, perpendicularly to said base, to the inner surface of the inner skin 2. The bases 6 of the successive channels are joined to one another by strips 8. The material of said parts 1 to 8 is ductile and consists, for example, of steel 37.

5

Figure 3 shows the case where a section of double-skinned ship's side according to Figures 1 and 2 has been subjected to a severe collision. The outer skin 1 has moved somewhat inwards and the side walls 4 and 5 of the channel have been bent. The stringer 7 has become curved. No holes are produced during the collision. In fact, there is question of a membrane stress.

10

In the embodiment according to Figure 4 the channels are of semi-cylindrical construction.

Figure 5 shows an embodiment in which channels 3 are attached both to the inner surface of the outer skin and to the inner surface of the inner skin and the stringers 7 extend between the bases of the channels positioned opposite one another.

15

The structure according to the invention employed in a ship having a double-skinned hull has now been tested and the result was astonishing. The energy absorbed by the structure in a severe collision with a ram ship was found to be so effective that the outer skin exhibited shallow denting over a large surface (this skin behaved as a membrane) and there was no holing.

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Claims

1. Collision-resistant double-skinned structure having an outer skin and an inner skin, comprising:
- 5 a series of channels (3) made of a ductile material and positioned alongside or above one another, which channels are attached by the tips of their side walls (4, 5) to the inner surface of the outer skin (1) of the structure, the base (6) of each channel being connected at least by a stringer (7), essentially perpendicular to said base, to the inner skin of the structure or to a construction attached thereto.
- 10 2. Structure according to Claim 1, characterised in that the bases (6) of successive channels are joined to one another by means of strips (8) or a stringer.
- 15 3. Structure according to Claim 1 or 2, characterised in that those channel parts (4, 5) directed towards the inner surface of the outer skin of the ship's side make an angle α of less than 90° with said outer skin.
- 20 4. Structure according to one of the preceding claims, characterised in that channels (3) are also arranged on the inner surface of the inner skin (2), which channels (3) are attached by the tips of the side walls to said inner surface, and in that the said stringers (7) extend between the channels (3) arranged on the outer skin (1) and the channels (3) arranged on the inner skin (2).
- 25 5. Structure according to one of the preceding claims, characterised in that the channels (3) of each series are joined to one another to form a corrugated plate.
6. Structure according to one of the preceding claims, characterised in that the structure is made of steel 37.

ABSTRACT OF THE DISCLOSURE

5 An impact-resistant double-skinned structure, such as a double-skinned ship's side, includes an outer skin and an inner skin. A series of channels made of a ductile material and positioned alongside or above one another are attached by the tips of their side walls to the inner surface of the outer skin of the structure. The base of each channel is connected at least by a stringer, essentially perpendicular to the base, to the inner skin of the structure or a construction attached thereto.

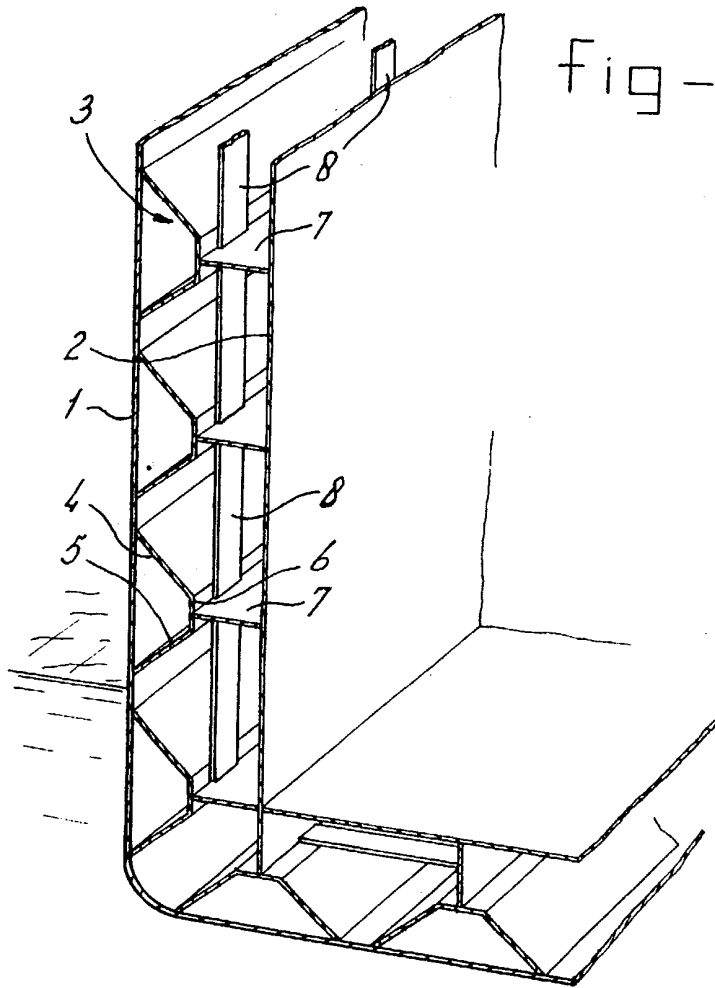


fig-1

fig-2

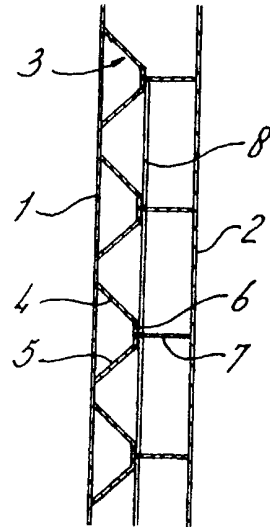


fig-3

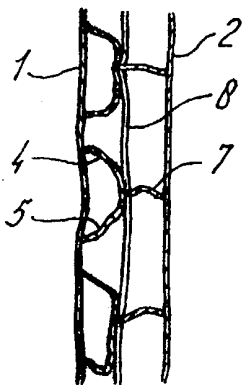


fig-4

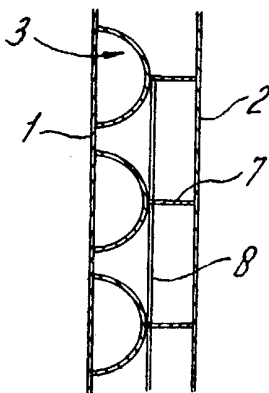
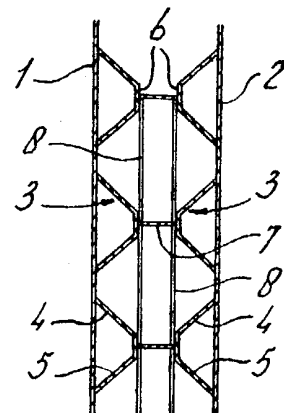


fig-5



COMBINED DECLARATION AND POWER OF ATTORNEY

C (ORIGINAL DESIGN, NATIONAL STAGE OF PCT OR CIP APPLICATION)

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

O Collision-resistant double-skin structure

the specification of which: (complete (a), (b) or (c) for type of application)

REGULAR OR DESIGN APPLICATION

a. ☐ is attached hereto.

b. ☐ was filed on
Serial No.

as Application
and was amended on

(if applicable)

P PCT FILED APPLICATION ENTERING NATIONAL STAGE

c. ☒ was described and claimed in International application No. PCT/NL99/00757
filed on 10 December 1999
and as amended on

(if any)

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

Y I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, paragraph 1.56(a).

In compliance with this duty there is attached an information
disclosure statement 37 CFR 1.97

PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code paragraph 119 of any foreign application (s) for patent of inventor's certificate listed below and have also identified below any foreign application for patent of inventor's certificate having a filing date before that of the application on which priority is claimed.

(complete (d) or (e))

- d. ☐ no such applications have been filed
 e. ☒ such applications have been filed as follows

C

**EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS
 (6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

Country	Application Number	Date of filing (day, month, year)	Date of Issue (day, month, year)	Priority claimed
the Netherlands	1010794	11 December 1998		Yes

O

**ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS
 (6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

CONTINUATION-IN-PART

P

(Complete this part only if this is a continuation-in-part application)

I hereby declare claim the benefit under Title 35, United States code, paragraph 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claim of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, paragraph 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, paragraph 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (Filing date) (Status) (patented, pending, abandoned)

Y

(Application Serial No.) (Filing date) (Status) (patented, pending, abandoned)

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoit CASTEL, Reg. No. 35,041, Eric Jensen, Reg. No. 37,855, and Thomas W. PERKINS, Reg. No. 33,027 and Roland E. Long, Jr. Reg. No. 41,949 c/o YOUNG & THOMPSON, Second Floor, 745 South 23rd Street, Arlington, Virginia 22202.

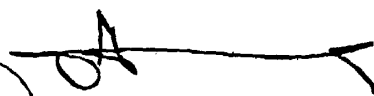
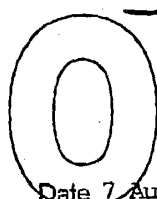
Address all telephone calls to Young & Thompson at 703/521-2297.

Customer No. 000466

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: LUDOLPHIJ, Johannes Wilhelmus Lubbertus

Inventor's signature

Date 7 August 2001

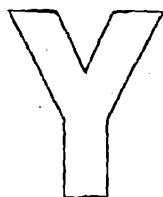
Country of Citizenship: the Netherlands

Residence: Vlissingen, the Netherlands NLX

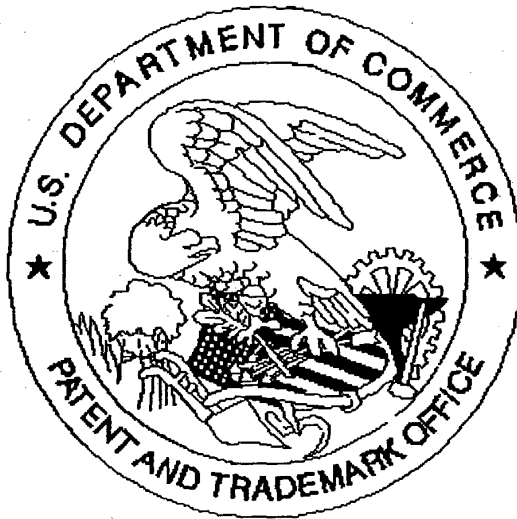
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